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EXAMINER
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WANG, RONGFA PHILIP

ART UNIT	PAPER NUMBER
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2191

DATE MAILED: 12/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/759,818

Applicant(s)

ZEMAN ET AL.

Examiner

Philip Wang

Art Unit

2191

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 16 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-42 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-42 is/are rejected.
- 7) ☒ Claim(s) 15, 20 and 21 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 1/14/2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 9/13/2004.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- ☐ Notice of Informal Patent Application
- ☐ Other: \_\_\_\_\_.

***Detail Action***

1. This office action is in response to the application filed on 1/16/2004.
2. Claims 1-42 are pending.

***Priority***

3. The priority date considered for this application is 5/2/2003.

***Claim Objections***

4. Claims 15 and 20 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claims 15 and 20 appear to be in dependent form(s) of a method claim(s) while claiming subject matters that are not methods.

5. Claim 21 is objected to because of the following informalities: the instant claim contains two periods. Line 6 of the claim body contains a period that should be removed. Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any

Art Unit: 2191

person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 15 and 20 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The instant claims recite the limitation of a co-processing device. The Applicant's specification does not specifically disclose what is a co-processing device.

The following is a quotation of the second paragraph of 35 U.S.C. 112:  
The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claim 42 recites the limitation "the criterion" in "wherein the criterion determines". There is insufficient antecedent basis for this limitation in the claim. This rejection can be overcome by changing "wherein the criterion determines" to "further comprise a criterion that determines".

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1-42 are rejected under 35 U.S.C. 102(b) as being anticipated by Zandy et al. (herein ZDY, "Process Hijacking").

As per claim 1, ZDY discloses

- initiating said shadow process in debug mode in said first execution environment (p. 117, right col., 2<sup>nd</sup> para. - p. 178, left col., the examiner asserts that a hijacked process is a bifurcated process; p. 178, left col., last item, line 7-9, "...process hijacking...previously shown to be useful for debugging...");
- initializing said trusted agent process in said second execution environment (Fig. 1, RPC stub is an agent);
- attaching said debugger to said shadow process; once said debugger is attached, allowing said shadow process to schedule execution of said process by said trusted agent (p. 117, right col., line 1, "...dynamically schedule...").

As per claim 2,

the rejection of claim 1 is incorporated;

ZDY discloses

- said step of initiating said shadow process comprises sending an agent image to said second execution environment (p. 180, right col., 2<sup>nd</sup> para., ).

As per claim 3,

the rejection of claim 1 is incorporated;

ZDY discloses

- said step of initiating said shadow process comprises sending notification that said process should be debugged to said second execution environment (p. 178, left col., last item, line 7-9, "...process hijacking...previously shown to be useful for debugging...").

As per claim 4,

the rejection of claim 1 is incorporated;

ZDY discloses

- said step of initiating said shadow process comprises sending a unique identifier of said shadow process to said second execution environment (see Fig. 1).

As per claim 5,

the rejection of claim 1 is incorporated;

ZDY discloses

- said step of initiating said shadow process in debug mode in said first execution environment comprises: deferring the scheduling of execution of said process by said trusted agent (p. 178, right col., 2<sup>nd</sup> item).

As per claim 6,

the rejection of claim 1 is incorporated;

Art Unit: 2191

ZDY discloses

- said step of initializing said trusted agent process in said second execution environment comprises laying out process memory structures in memory (p. 179, left col., 1<sup>st</sup> para., "...allocating memory...").

As per claim 7,

the rejection of claim 1 is incorporated;

ZDY discloses

- said step of initializing said trusted agent process comprises sending a unique shadow process identifier for said shadow process to said second execution environment (p. 178, left col., for example, line 19, "...sending a signal...").

As per claim 8,

the rejection of claim 7 is incorporated;

ZDY discloses

- said unique shadow process identifier comprises a process environment block (PEB) (p. 180, section 3.1, 1<sup>st</sup> para., "...preserve open-file state...").

As per claim 9,

the rejection of claim 7 is incorporated;

ZDY discloses

Art Unit: 2191

- said unique shadow process identifier is used to verify an identity of said process when a request regarding process memory is sent by said debugger to said second execution environment (p. 179, left col., line 1-2, "...reading and writing the memory of the mutatee...").

As per claim 10,

the rejection of claim 7 is incorporated;

ZDY discloses

- said step of initializing said trusted agent process further comprises sending a unique shadow thread identifier corresponding to each shadow thread of said shadow process to said second execution environment (Fig.2 & 3).

As per claim 11,

the rejection of claim 10 is incorporated;

ZDY discloses

- said unique shadow thread identifier comprises a kernel thread (KTHREAD) pointer (p. 179, right col., 1<sup>st</sup> para., "...kernel-level threads...").

As per claim 12,

the rejection of claim 10 is incorporated;

ZDY discloses

- said unique shadow thread identifier is used to verify an identity of trusted agent thread corresponding to said shadow thread corresponding to said unique



Art Unit: 2191

shadow thread identifier when a request regarding thread context of said trusted agent thread is sent by said debugger to said second execution environment (p. 177, right col., 2<sup>nd</sup> para. - p. 178, right col.).

As per claim 13,

the rejection of claim 1 is incorporated;

ZDY discloses

- determining whether debugging should be permitted on said bifurcated process, and aborting debugging of said bifurcated process if said determination concludes that debugging should not be permitted (p. 178, left col., 2<sup>nd</sup> item, line 7, "...access authentication services...").

As per claim 14,

the rejection of claim 13 is incorporated;

ZDY discloses

- determining whether a debugging flag is set for said bifurcated process (p. 178, left col., 2<sup>nd</sup> item, line 7, "...access authentication services...").

As per claim 15,

- it is rejected for the same reason set forth for the rejection of claim 1.

As per claim 16,

ZDY discloses a method for debugging a bifurcated process, where said process is scheduled using a shadow process comprising at least one shadow thread running in a first execution environment and where said bifurcated process is executed using a trusted agent process running in a second execution environment, where said trusted agent process comprises trusted agent threads, each of said trusted agent threads corresponding to one of said shadow process threads, said method comprising:

- receiving a request message from said debugger regarding a resource (p. 117, right col., 2<sup>nd</sup> para. - p. 178, left col., the examiner asserts that a hijacked process is a bifurcated process; p. 178, left col., last item, line 7-9, "...process hijacking...previously shown to be useful for debugging...");
- verifying an identity of said requested resource from said request message; performing the request in said request message; and responding to said request message with the result of said request (p. 178, left col., for example, 2<sup>nd</sup> item, "...the system call functions...").

As per claim 17,

the rejection of claim 16 is incorporated;

ZDY discloses

- where said steps of receiving a request message from said debugger regarding a resource, verifying the identity of said requested resource from said request message, performing the request in said request message, and responding to said request message with the result of said request are performed by an admin thread running in said second execution environment (FIG. 1).

As per claim 18,

the rejection of claim 17 is incorporated;

ZDY discloses

- where said admin thread is owned by said bifurcated process (p. 177, right col., 1<sup>st</sup> para., "...mirated to foreign administrative domain...").

As per claim 19,

the rejection of claim 16 is incorporated;

ZDY discloses

- where said request message comprises a request selected from among the following group: a request to get thread context for one of said trusted agent threads; a request to set thread context for one of said trusted agent threads; a request to read process memory for said trusted agent process; and a request to write process memory for said trusted agent process (p. 178, left col. I/O operations).

As per claim 20,

- It is rejected for the same reason set forth for the rejection of claim 16.

As per claim 21,

ZDY discloses a system comprising:

- a first execution environment that comprises a scheduler, said first execution environment being adapted to schedule and dispatch a plurality of threads for execution on a processor, said first execution environment being further adapted to initiate a shadow process in debug mode in said first execution environment, to attach a debugger to said shadow process, and to, upon receipt of an indication that execution should begin, to schedule at least one thread of said shadow process; a second execution environment that is adapted to dispatch a plurality of second threads for execution on said processor, said second execution environment being further adapted to initialize a trusted agent process corresponding to said shadow process in said second execution environment, and to, upon completion of said initialization, send an indication that execution should begin to said first execution environment (p. 117, right col., 2<sup>nd</sup> para. - p. 178, left col., the examiner asserts that a hijacked process is a bifurcated process; p. 178, left col., last item, line 7-9, "...process hijacking...previously shown to be useful for debugging..."; Fig. 1, RPC stub is an agent; p. 117, right col., line 1, "...dynamically schedule...").

As per claims 22-31, 34 and 35

- they recite the limitation of claims 2-5, 7-12 respectively and are rejected for the same reasons for set forth for the rejection of claims 2-5, and 7-14.

As per claim 32,

the rejection of claim 21 is incorporated;

ZDY discloses

- wherein said first execution environment comprises a first operating system, and wherein said second execution environment comprises a second operating system (see Fig. 1).

As per claim 33,

the rejection of claim 21 is incorporated;

ZDY discloses

- wherein the first execution environment is expected to conform its behavior to a first specification, wherein said second execution environment is expected to conform its behavior to a second specification, and wherein the expectation that the second execution environment will behave according to the second specification is relatively greater than the expectation that the first execution environment will conform its behavior to the first specification (see Fig. 1).

As per claim 36,

ZDY discloses

- a first execution environment that comprises a scheduler, said first execution environment being adapted to schedule and dispatch a plurality of first threads for execution on a processor, said first execution environment running at least one shadow process comprising at least one shadow process thread, where a debugger is attached to said shadow process; a second execution environment

that is adapted to dispatch a plurality of second threads for execution on said processor, said second execution environment running at least one trusted agent, each of said at least one trusted agent corresponding to one of said at least one said shadow process, where each of said at least one trusted agent comprising at least one trusted agent thread, where each of said trusted agent threads corresponds to one of said shadow process threads, where a bifurcated process comprises said shadow process and said trusted agent (p. 117, right col., 2<sup>nd</sup> para. - p. 178, left col., the examiner asserts that a hijacked process is a bifurcated process; p. 178, left col., last item, line 7-9, "...process hijacking...previously shown to be useful for debugging..."; Fig. 1, RPC stub is an agent; p. 117, right col., line 1, "...dynamically schedule...") and is scheduled using said shadow process and executed using said trusted agent, and where said second execution environment is adapted to (a) receive a request message from said debugger regarding a resource (p. 179, left col., "...reading and writing the memory of the mutatee..."); (b) verify an identity of said requested resource from said request message (p. 177, right col., 2<sup>nd</sup> para. - p. 178, right col.); (c) perform the request in said request message; and (d) respond to said request message with the result of said request (p. 179, left col., "...reading and writing the memory of the mutatee...").

Art Unit: 2191

the rejection of claim 36 is incorporated;

ZDY discloses

- where said request message comprises a request selected from among the following group: a request to get thread context for one of said trusted agent threads; a request to set thread context for one of said trusted agent threads; a request to read process memory for said trusted agent process; and a request to write process memory for said trusted agent process (p. 178, left col.).

As per claim 38,

the rejection of claim 36 is incorporated;

ZDY discloses

- where said second execution environment stores unique identifier information for each possible resource for which a valid request may be made, and where said verification of an identity of said requested resource comprises determining whether said resource is one of said possible resources for which a valid request may be made (p. 178, left col.).

As per claim 39,

the rejection of claim 36 is incorporated;

ZDY discloses

- where said second execution environment stores identifier information comprising unique process identifier information for said shadow process and unique thread identifier information for said shadow threads, and said verification of said requested resource from said request message comprises using said

Art Unit: 2191

identifier information to identify the resource in said second execution environment (p. 178, left col.).

As per claim 40,

the rejection of claim 36 is incorporated;

ZDY discloses

- wherein said first execution environment comprises a first operating system, and wherein said second execution environment comprises a second operating system (Fig. 1).

As per claim 41,

the rejection of claim 36 is incorporated;

ZDY discloses

- wherein the first execution environment is expected to conform its behavior to a first specification, wherein said second execution environment is expected to conform its behavior to a second specification, and wherein the expectation that the second execution environment will behave according to the second specification is relatively greater than the expectation that the first execution environment will conform its behavior to the first specification (Fig. 1).

As per claim 42,

the rejection of claim 41 is incorporated;



Art Unit: 2191

- further comprise a criterion that determines whether running the second thread would cause the second execution environment to behave in a manner that would violate the second specification(p. 178, left col., 1<sup>st</sup> item, line 8-11, "...a process running on a machine..." The examiner asserts that if such conversion is allowable, that implies such criterion exist to allow the conversion.).

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

It is noted that any citation [[s]] to specific, pages, columns, lines, or figures in the prior art references and any interpretation of the references should not be considered to be limiting in any way. A reference is relevant for all it contains and may be relied upon for all that it would have reasonably suggested to one having ordinary skill in the art. [[See, MPEP 2123]]

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Philip Wang whose telephone number is 571-272-5934. The examiner can normally be reached on Mon - Fri 8:00AM - 4:00PM. Any inquiry of general nature or relating to the status of this application should be directed to the TC2100 Group receptionist: 571-272-2100.

Art Unit: 2191

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wei Zhen can be reached on 571-272-3708. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*Mary Stetler*  
*Primary Examiner*  
*12.5.2006*